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(54) METHOD AND APPARATUS FOR POLLUTION CONTROL OF CONFINED SPACES

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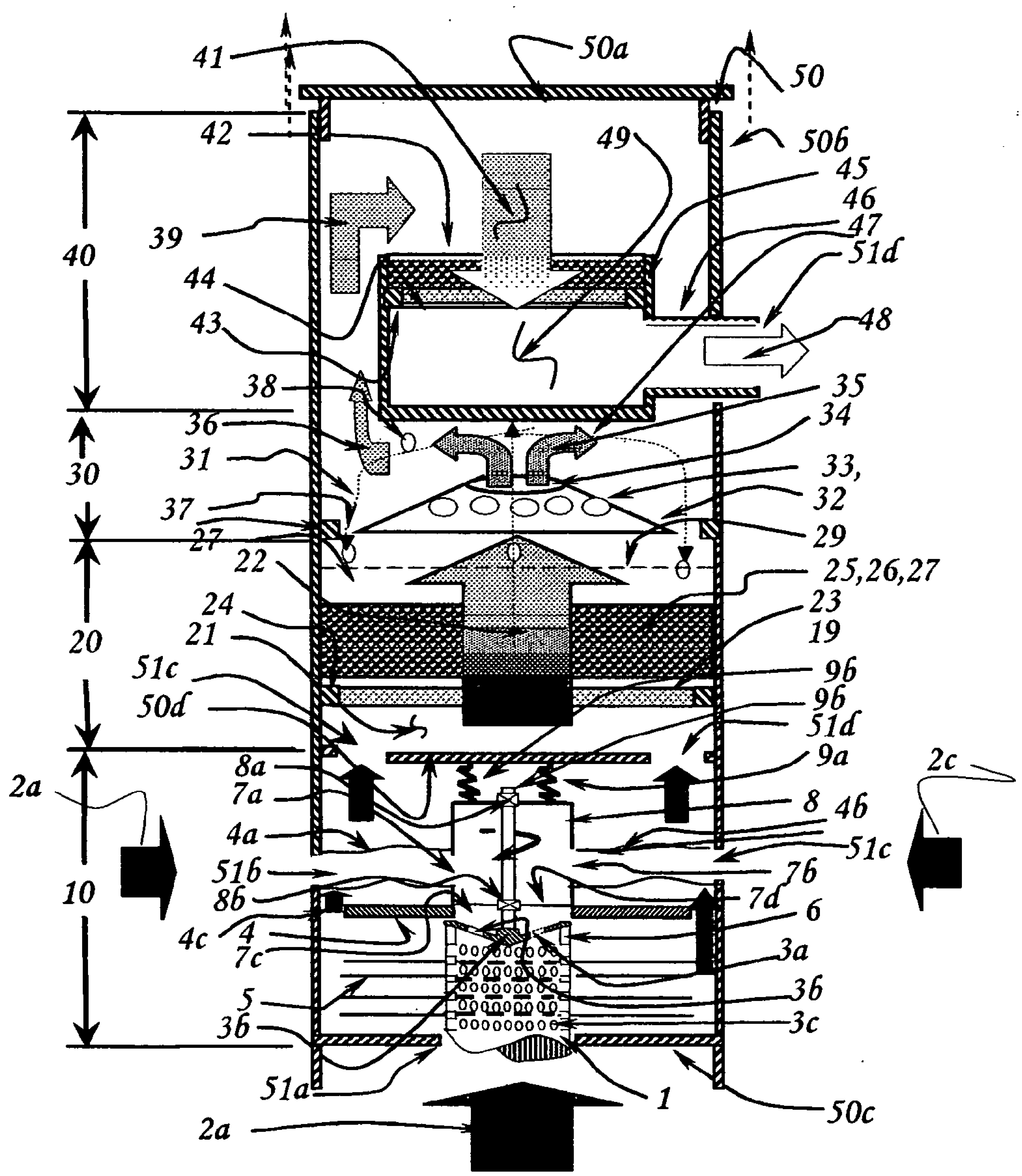
(57) **ABSTRACT**

A method of improve the removal of particulate matter, heavy metals, neutralizing acid, and kill microorganism pollutants, known to be in contaminated air volumes of occupied confined spaces, when exposed in close contact under pressure to a mixture of alkaline sorbent materials, having a known synergism between said pollutants using a self propelled fluidized bed reactor and packed bed filter apparatus system to optimize the contact collection efficiency of submicron particles and organic compounds.



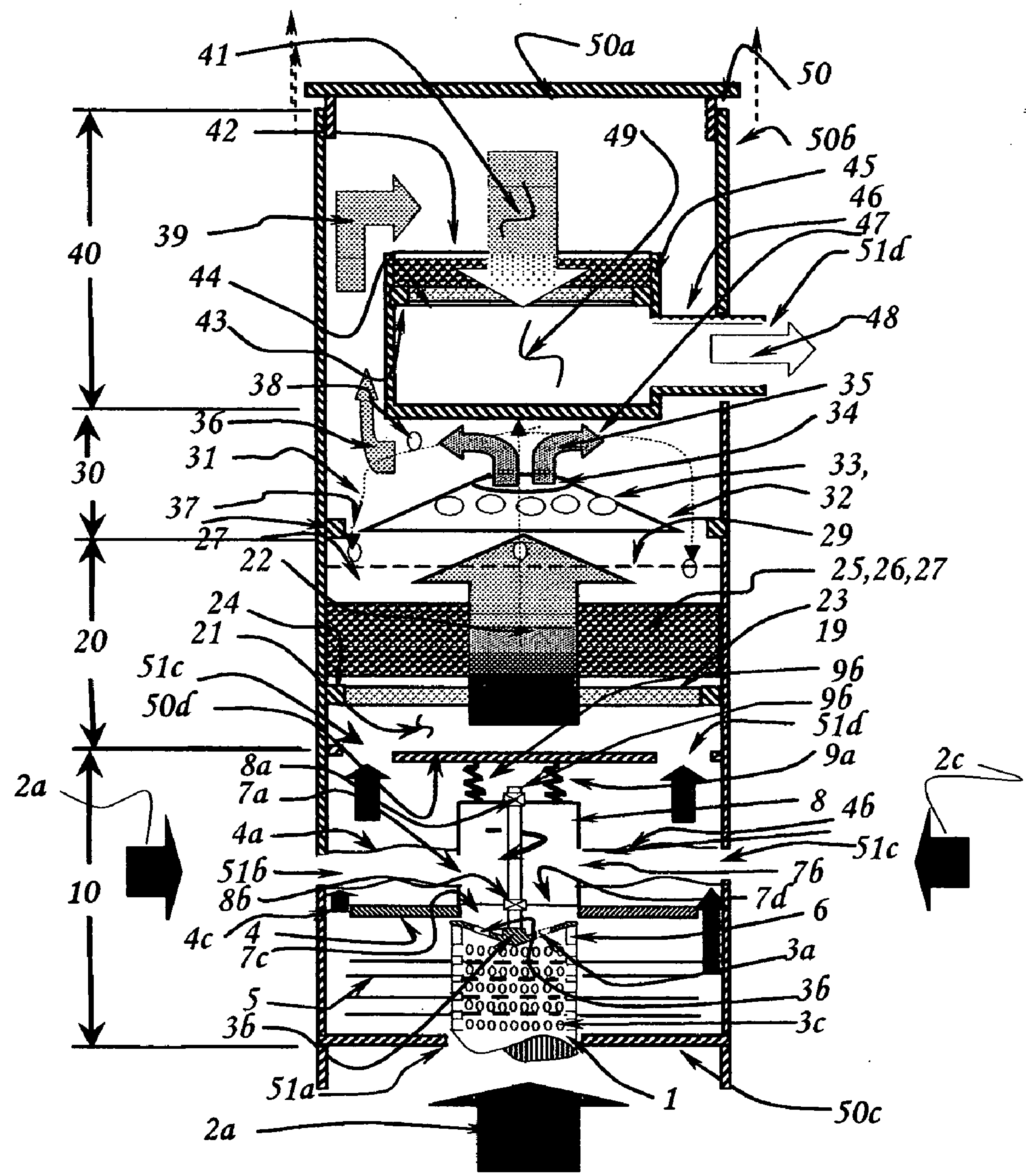

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Fig. 1

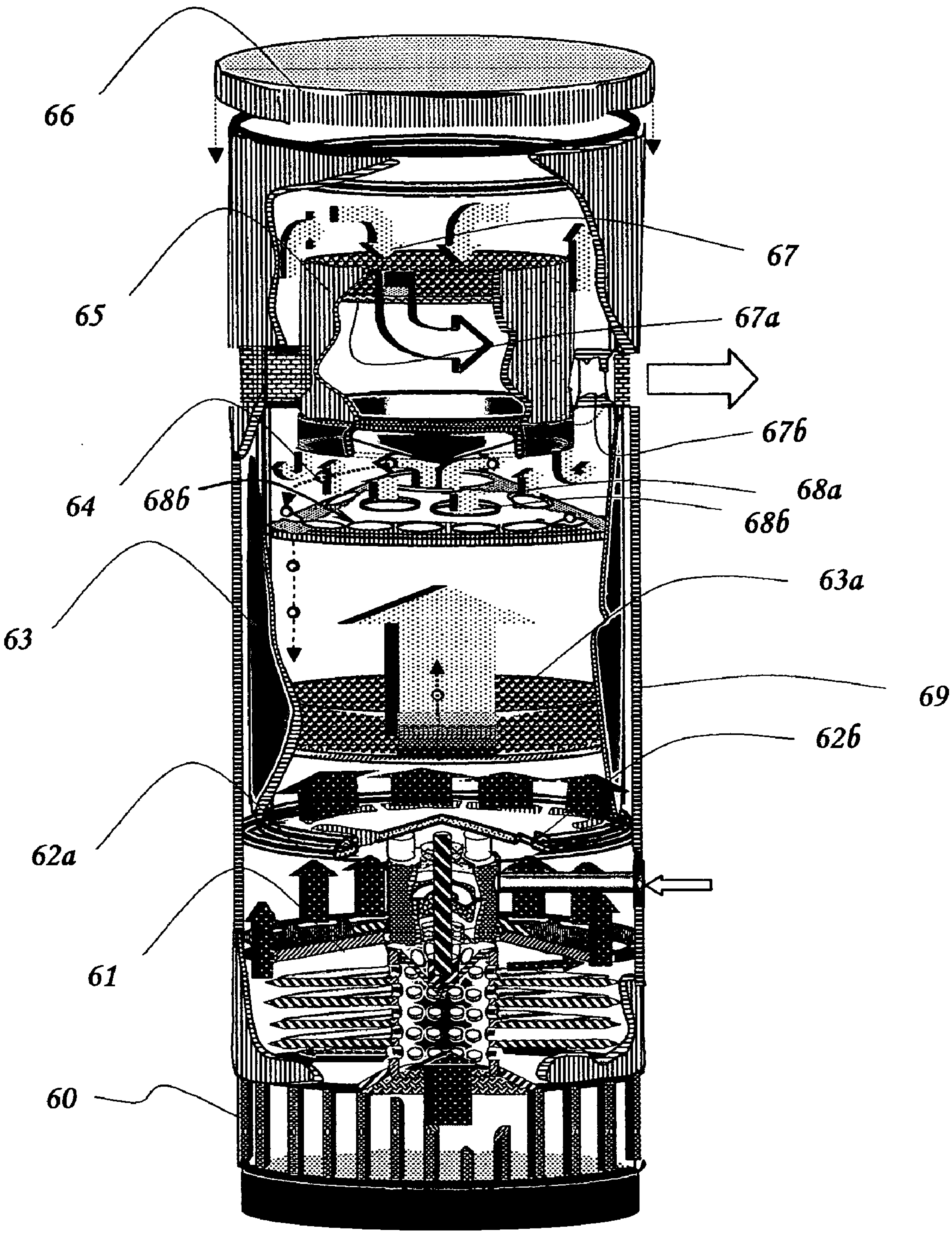

Fig. 2

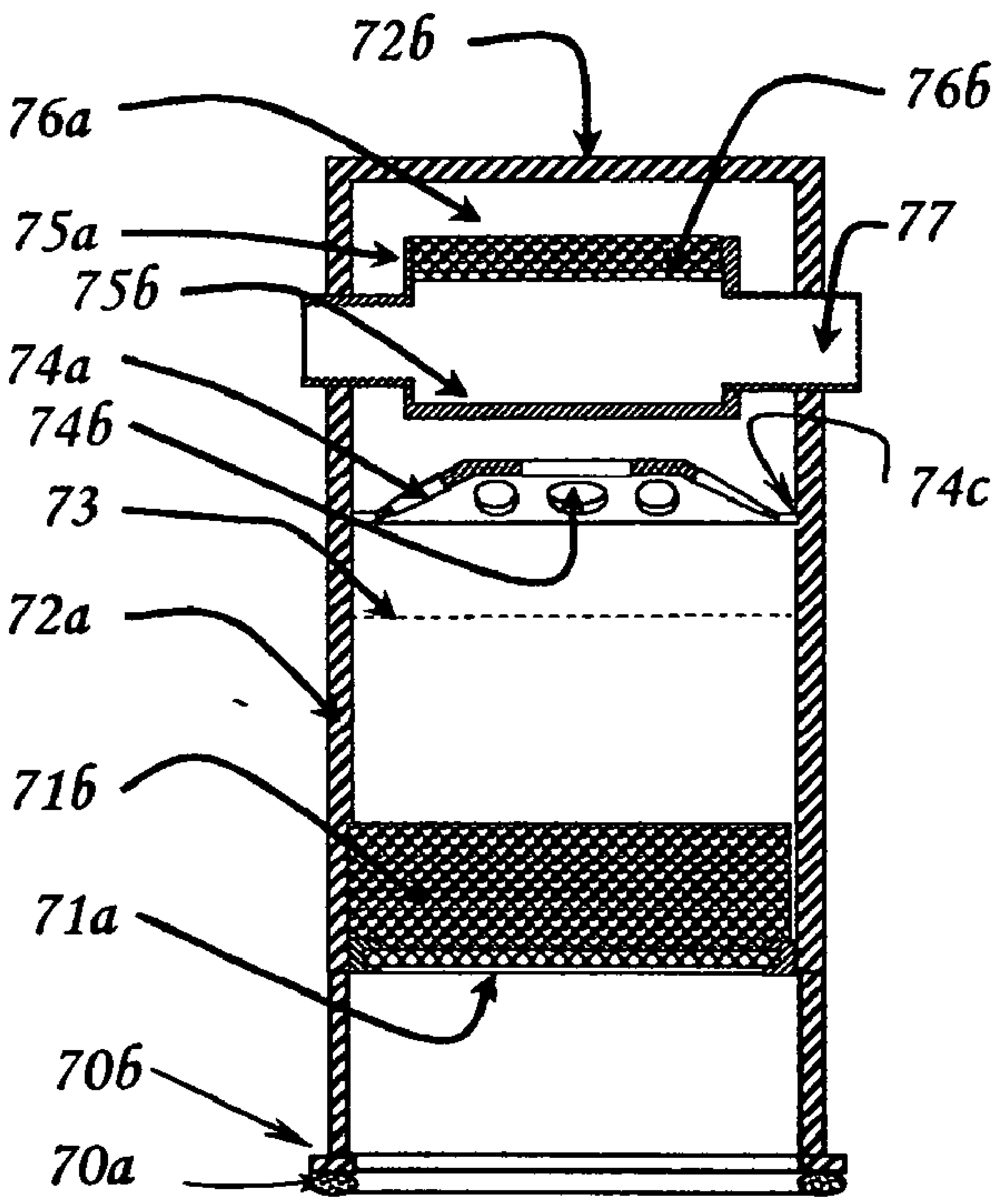

Fig. 3a

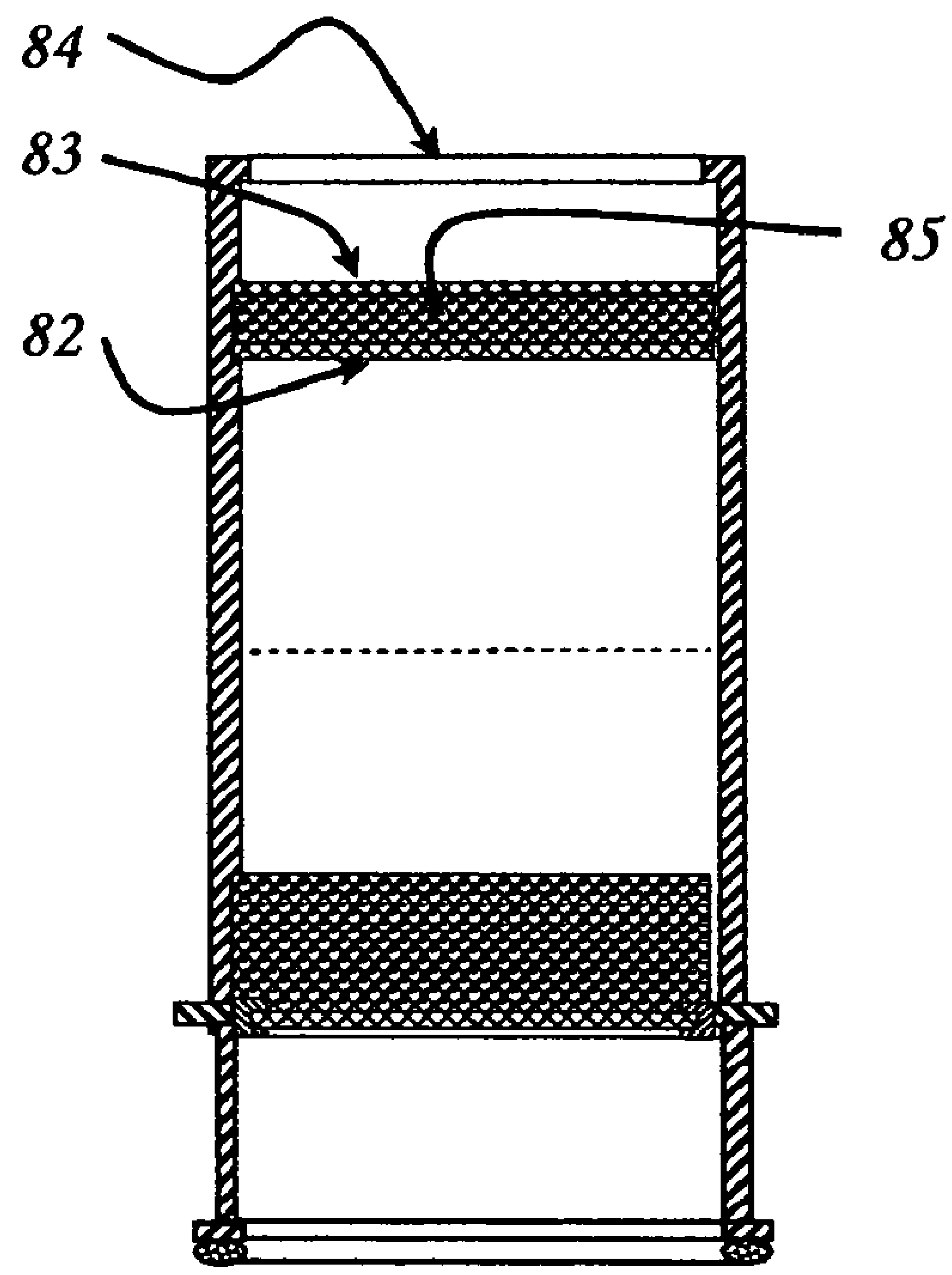

Fig. 3b

Figure 3

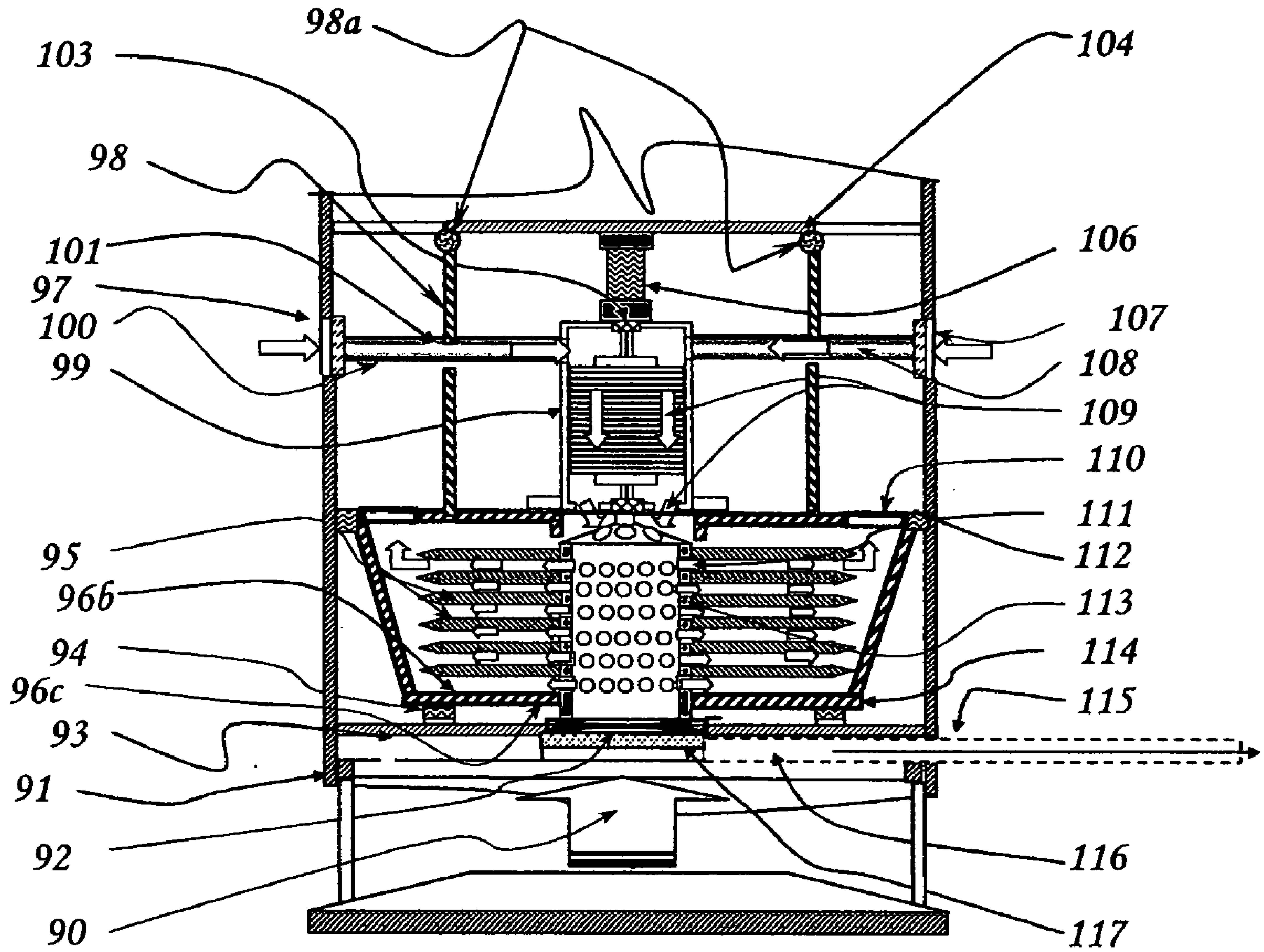
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Figure 4

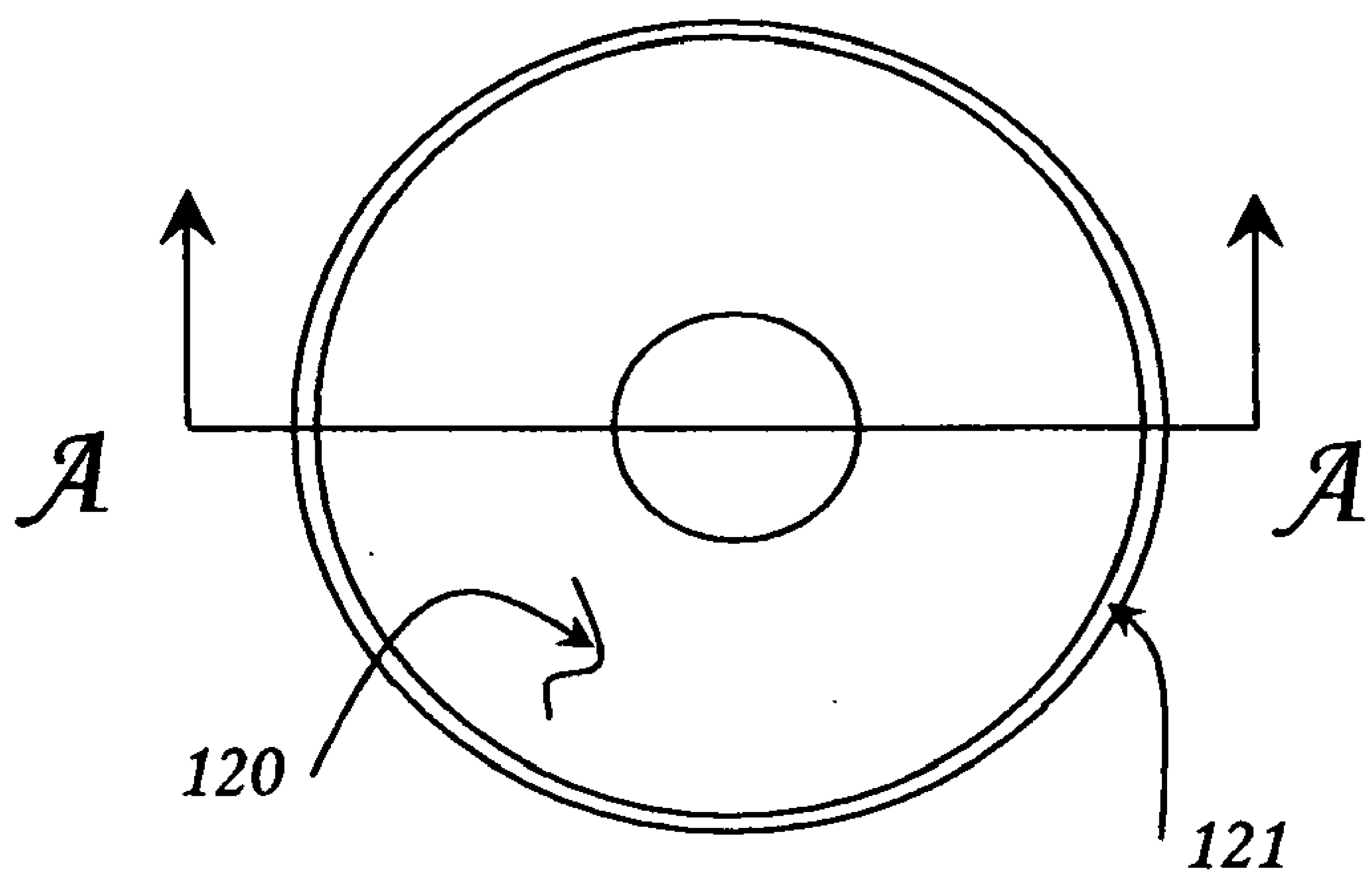


Fig. 5a

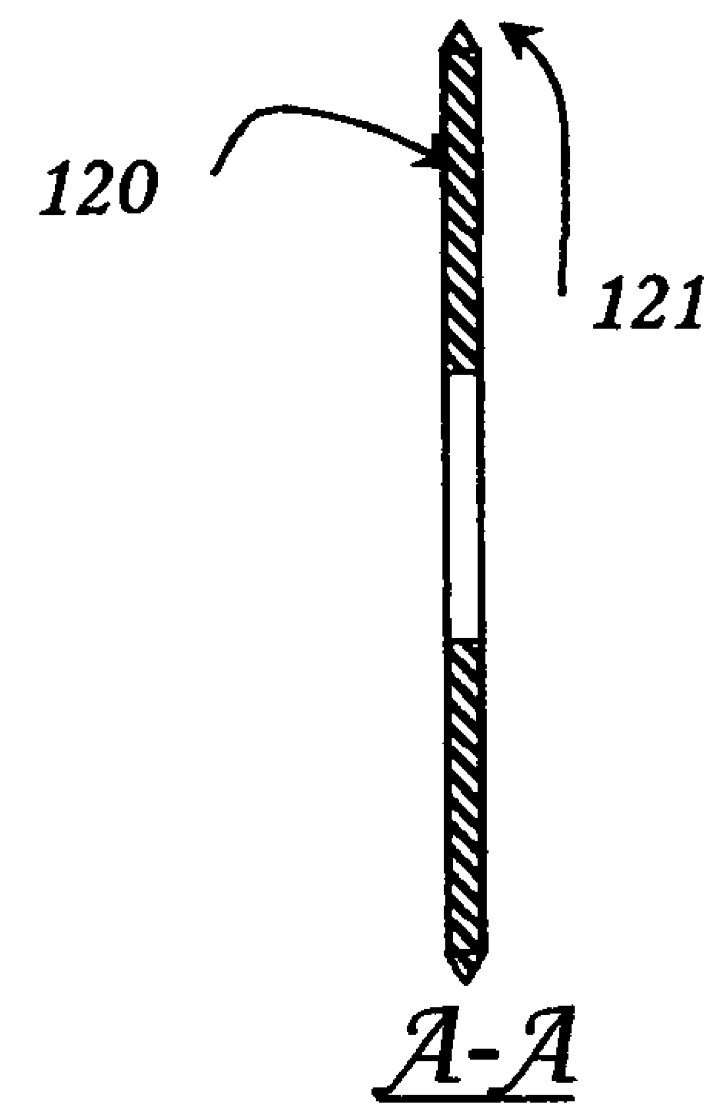


Fig. 5b

Figure 5

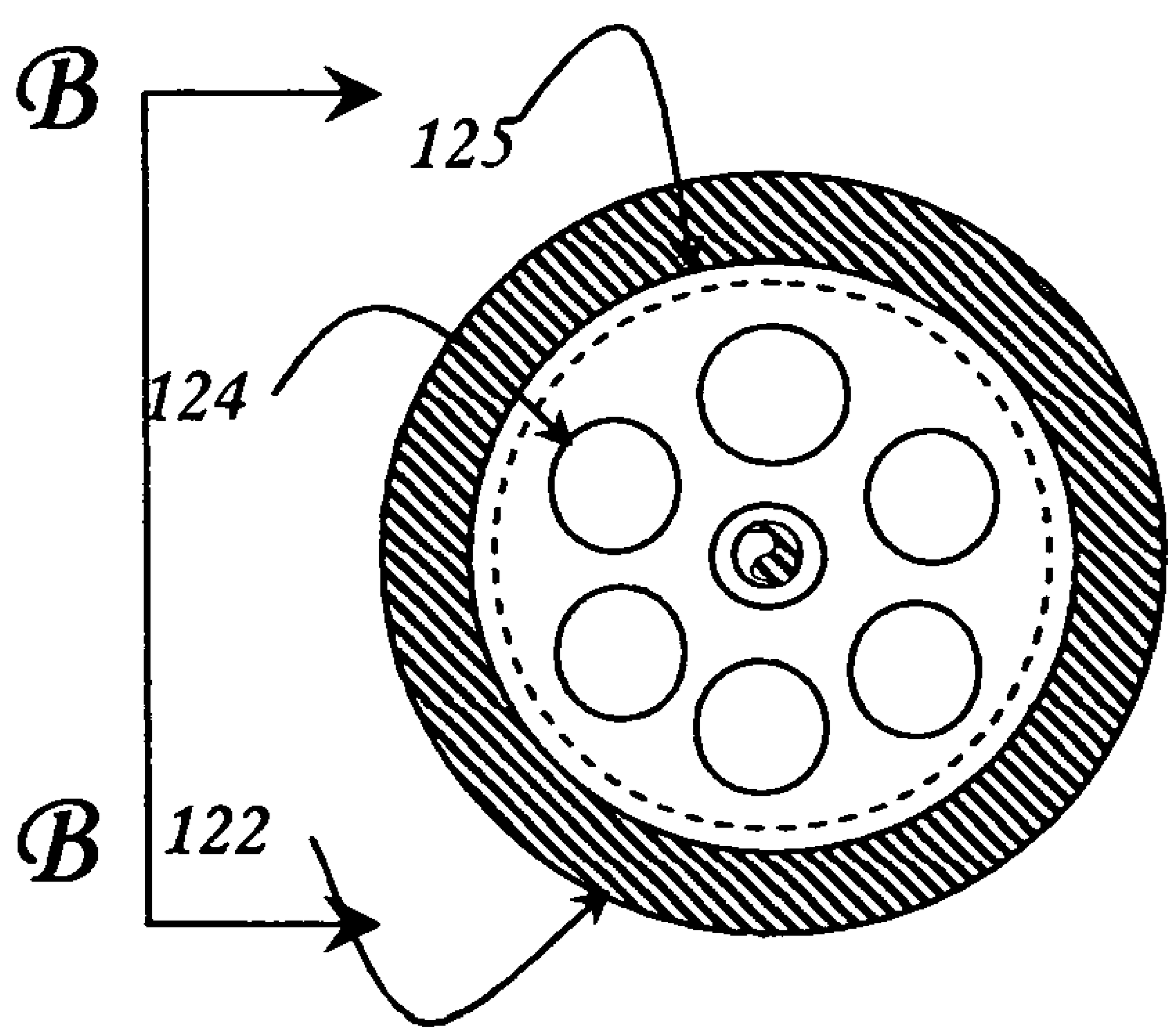


Fig. 6a

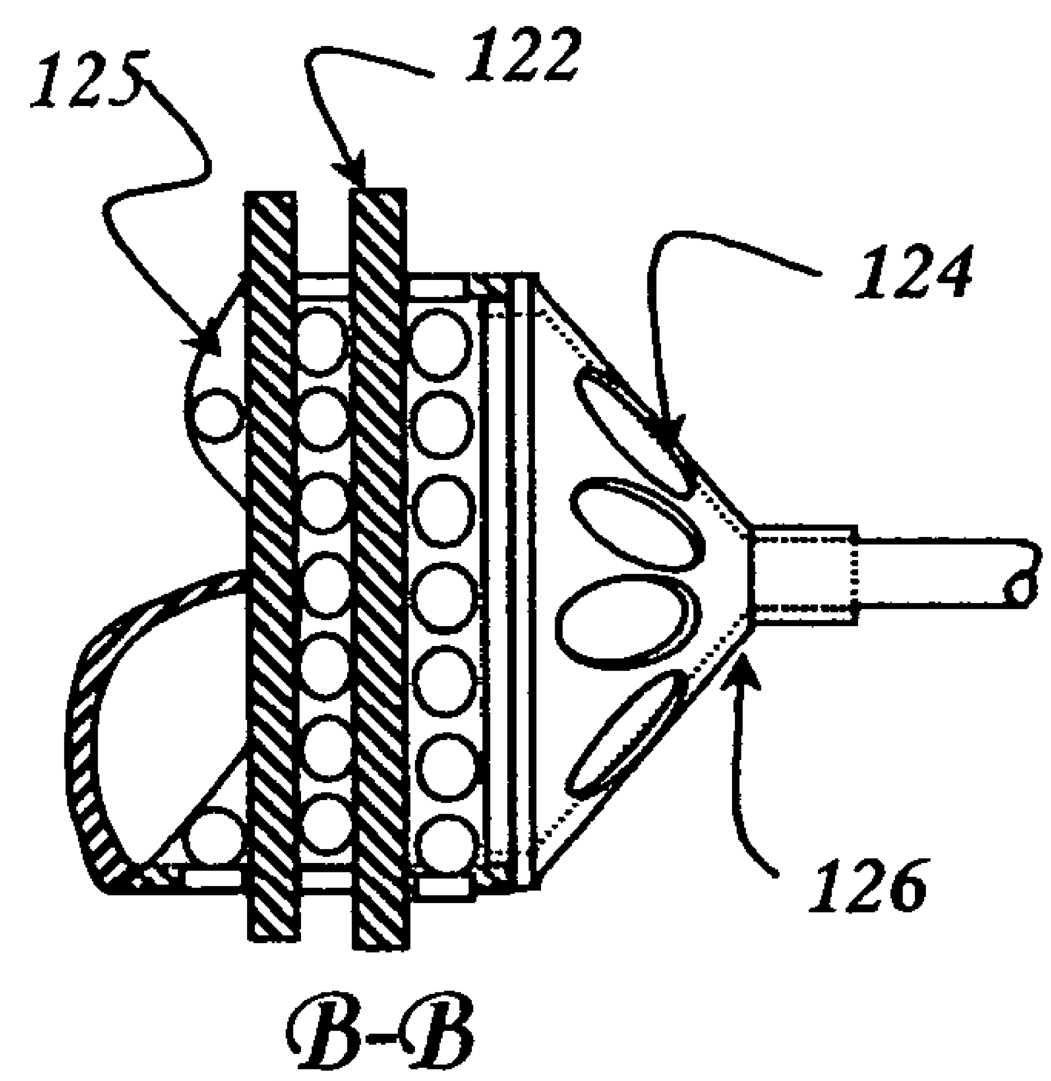
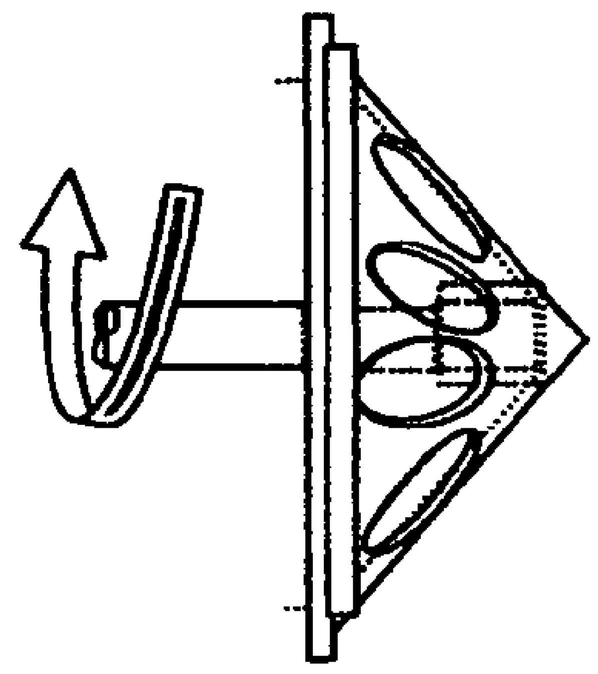


Fig. 6b

Figure 6



B-B

Fig. 6c

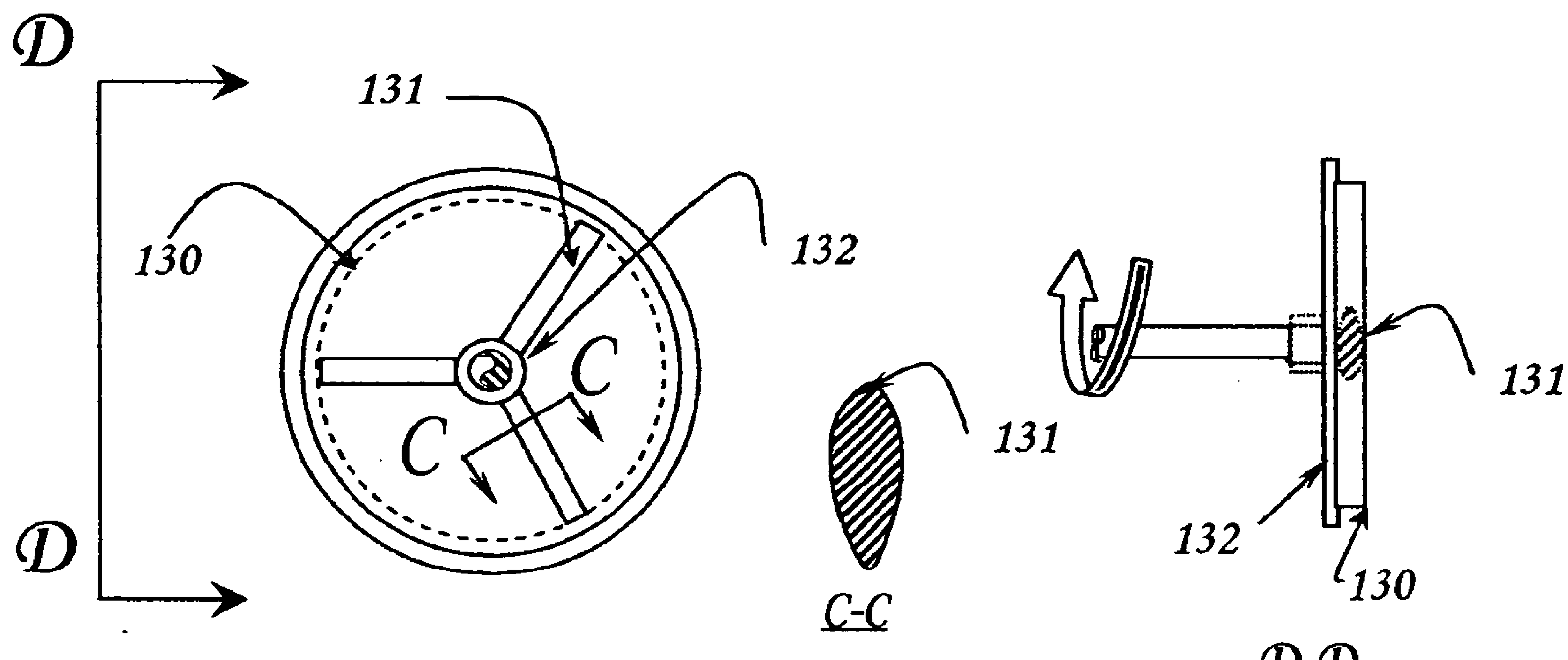


Fig. 7 a

Fig. 7 b

Fig. 7c

Fig. 7

METHOD AND APPARATUS FOR POLLUTION CONTROL OF CONFINED SPACES

CROSS REFERENCE TO RELATED PATENTS AND APPLICATIONS

[0001] This invention is a based on prior art U.S. Pat. No. 6,451,091 B1, entitled "Apparatus and Method for Emissions Control Through Continuous Filtration System" and U.S. patent application Ser. No. 10/867,943 filed on Jun. 14, 2004 entitled "Method And Apparatus For Combined Cycle Fluid Propulsion".

BACKGROUND OF INVENTION

[0002] This instant invention relates to a method and apparatus useful in the removal of harmful pollutants known to be found in occupied confined spaces to the improvement of indoor air quality. A 1989 EPA Report to Congress concluded that improved indoor air quality can result in higher productivity and fewer lost workdays. EPA estimates that poor indoor air may cost the nation tens of billions of dollars each year in lost productivity and medical care. The National Energy Management Institute (NEMI) reports that approximately 80% of commercial buildings do not comply with engineering standards to provide the best indoor air quality for building occupants. The main pollutants found in indoor confined spaces are: Volatile Organic Compounds: (VOCS), are commonly acetic acid, ammonia, hydrogen sulfide, benzene, toluene, and formaldehyde associated with solvents from, floor and wall construction materials. Ozone: O3 is as a powerful oxidant found in nature and generated by printing process, this pollutant is also known to be toxic to humans in small concentrations above 10 ppm. Ozone is a health hazard that can cause eye and mucous membrane irritation and chronic respiratory disease. Carbon Monoxide: (CO) OSHA regulates levels of CO for industrial settings, but a level lower than 2 ppm is typical in an office setting. Airborne Bacteria, Mold and Fungi: No regulations have been established for biological contaminants, however a range of acceptable levels has been recommended to be less than 700 spores in a cubic meter of air. Environmental Tobacco smoke (ETS) is a known carcinogen which can exist in the indoor air. Radon Gas, is a known carcinogen which causes thousands of cancers cases per year.

[0003] Current indoor environment pollution control technology is unable to provide one system to filter particulate matter, absorb VOC's, neutralize acids, capture heavy metals, and provide a 99.99% kill rates of all known microorganisms. In addition to insufficient control capability the present technologies in the retail and commercial market have a inherent health risk over seen by current studies which involves user handing of dirty filters during replacement, as filters are removed exposure is many times higher than normal breathing air in a contaminated room. Other aspects of prior art technology have been known to be harmful and have been reported in EPA studies and many other government agencies. In the case of ozone, which is finding an ever increasing usage in the retail markets the hazardous to human health of the users as outlined by the Environmental Protection Agency, Occupational Safety and Health Administration, Food and Drug Administration, and the National Institute of Occupational Safety and Health which have set very low limits on ozone exposure all of which are below 10 parts per million. These ozone generators emit trillions of times more than the safe limit into confined spaces on a daily basis.

[0004] Other more recent considerations exist for improved treatment of confined space air quality associated with indoor air, highlighted by September 11th and mailing of anthrax spores continual present a threat to the U.S. Homeland Defense which is seeking highly effective means to reduce the threat of biological and chemical weapons of mass destruction such as anthrax and nerve gases to improve U.S. National Security.

[0005] In accordance with the present invention, however, it has been found that the combination of certain air treatment processes is unnecessary to provide a solution to the removal of all indoor pollution, and resolving a National health hazard exists in a simplified version currently used in flue gas scrubbing. This method known to be effective in the collection of all of the said pollutants requiring treatment. The current invention absorbs VOC's, neutralizes acids, traps heavy metals, absorbs nitrogen oxide, collects PM down to 0.01 microns in diameter.

[0006] In addition to the chemical, acid, and heavy metal recovery this method as applied in the present invention also has is known to kill microorganism including viruses, bacteria, fungi, mold, and spores on contact. The present invention as an anti-acid offers the opportunity to absorb and neutralize nerve gases, and kill anthrax spores.

FIELD OF THE INVENTION

[0007] The most efficient methods known in air pollution control are found in application controlling flue gas emissions from utility and industrial processes, known as flue gas scrubbers (FGS). This technology has been repeatedly tested over the past 10 years as required by State Governments by the Clean Air Act. The method applies a known process of pollutant contact with an alkaline sorbent know be a highly reliable and efficient processes in the control of emissions. The present invention applies the method sorbent treatment method in a unique way by fluidized bed suspension using a mixture of well known alkaline sorbent materials having a porous and reactive surface. As contact proximity is known to being a key factor in effectiveness in absorbing chemical pollutants and current technology applies this method in FGS treatment to fluid stream by sorbent injection, combustion injection, and alkaline spray treatment all unpractical in indoor environments. The current invention uses fluid flow process known as fluidization to maximize alkaline contact in air stream treatment of confined space. In addition it is also known in flue gas streams that some agents used in this process react under heat to increase contact area and improve absorption by decomposition developing a greater surface area. Some sorbents are used because of their porous nature when treated by heat prior to injection and are found effective treatment process such as active carbon, which is treated by heat in its manufacturing process. Some alkaline agents are injected into a hot gas stream and decomposition occurs inset sue as in the decomposition of lime stone into calcium carbonate its increasing absorbance ability yet unstable at lower temperatures. Sodium bicarbonate is also used in injection into hot gas streams and decomposes into sodium carbonate developing contact surface areas similar to activated carbon increasing absorbency. The present invention applies a pretreatment of sodium bi carbonate prior to application to improve its application as it applies in the present invention. It is also known that in the art that differential pressure is another key factor in filtration efficiency in the removal of small particles. In FGS treatment it has been found that a coating of sorbent material placed upon tightly meshed screen is more effective as the coating increase improving efficiency. As Fluidized bed reaction and filter systems have been used in prior art applications with some effectiveness the opposing operation of these process has limited application of the treatment of contaminated fluid streams with significant particulate grain loading. It is known in the art that the application of fluidize bed only occurs with particles diameters greater than 150 microns, and that packed beds are most efficient when particles below 60 microns are used. As the segregations of the two particle sizes is necessary to each process for maximum efficiency. The present invention applies this knowledge by the incorporation of separation between the two process to maintain fluidized bed integrity and precoating of a filter substrate with small diameter particles maximize efficiency of both processes. As these both process are fluid stream pressure and velocity dependent to be effectively the utilization in the present invention of a boundary layer turbine fluid propulsion improves the art by presenting a novel approach in a modified version to provide simplified construction and application to generate the pressure and velocity necessary create a high pressure differential across said filter and velocities capable of fluidization of a solid bed required for a react surface area to occur sufficiently to improve efficiency.

SUMMARY OF INVENTION

[0008] In accordance with this instant invention, that utilizes applications and processes known in the art of air pollution control to remove pollutant constituents from a flowing gas stream under pressure through the application of a plurality of alkaline sorbents configured in a manner to absorb pollutants in said gas steam by contact with a full cross sectional area of said sorbent arranged upon a surface of a porous substrate having a plurality of inlets and outlets to allow to said gas to flow through said porous substrate and into the said alkaline sorbent bed comprised of a granular particles contained within a confined space. It is also known in the art that; a directional change to a flowing gas containing entrained particles will cause a large number of the particles to divert from the said flowing gas stream and respond to gravitational force collecting at the lowest point possible. It is also known in the art that contaminated gas flow under pressure will compress a densely packed layer of small diameter alkaline powder (<65 micron) applied to the surface of a porous substrate attached across the inlet and of a flowing gas stream, having a plurality of outlets to provide an efficient means to capture extremely small diameter particles, neutralize acids, absorb volatile organic compounds, capture heavy metals, and particle matter, and kill microorganisms retaining these pollutants within the said packed bed and allowing un-contaminated gas to pass through said bed. The present invention applies these known process in a novel way enclosure of these three processes principles within a first confined space (cartridge) housing having inlets and an outlets, set within a second outer housing containing a propulsion having a prime mover and speed controls, and enabled by a set of pressure switches set between the propulsion system and the fluidized bed plenum to register pressure set points in a way to warn low pressure and high pressure operation stalling operation in the event of set point obtainment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] **FIG. 1** is a vertical cross section of a simplified version of the embodiment of Pollution Control process and apparatus.

[0010] **FIG. 2** is a vertical cutaway cross sections of an embodiment of the invention utilizing a cartridge filter application the apparatus.

[0011] **FIG. 3** is a vertical cross section of a cartridge filter systems showing (**FIG. 3**_a_), is a vertical cross section of a cartridge with a fluidized bed reactor, a diverter cone, and a packed bed filter system. **FIG. 3**_b_. is a vertical cross section of a simplified cartridge have a fluidized bed, and a packed filter.

[0012] **FIG. 4** is a vertical cross-sections of one embodiment of the boundary layer propulsion system utilized in the invention.

[0013] **FIG. 5** is boundary layer disk details, showing, plate design details showing **FIG. 5**_a_ transverse section of disk, and **FIG. 5**_b_, vertical cross section of plate. **5**_c_. is a cross section of

[0014] **FIG. 6**. is transverse vertical view of flow conduit coupling attachment, **FIG. 6**_a_. is a vertical cross section of coupling attachment with exterior interior placement. **FIG. 6**_c_. a vertical cross section of another embodiment of said coupling attachment having interior placement.

[0015] **FIG. 7**. **FIG. 7**_a_. is transverse vertical view of flow conduit coupling attachment showing spoked attachments, **FIG. 7**_a_. C-C is a horizontal cross section of a spoke used in hub attachment to outer coupling attachment. **FIG. 7**_c_. is a vertical cross section of coupling attachment.

DETAILED DESCRIPTION

[0016] The present invention will be described with reference to the accompanying drawings which assist in illustrating the pertinent features thereof. The apparatus illustrated in **FIG. 1**, is a basic flow diagram of this instant air filtration invention, supplemented by U.S. patent application Ser. No. 10/867,943 filed on Jun. 14, 2004 entitled "Method And Apparatus For Combined Cycle Fluid Propulsion", dealing with the boundary layer propulsion apparatus method of operation, supplemented in present art to stated the mode of operation as applied to the present air filtration apparatus currently under presentation in this invention.

[0017] In the current invention an occupied confined space (not shown) having contaminated air and represented in the current embodiment by confined space inlet air containing volatile organic compounds, heavy metals, acids, particulate matter, and living microorganisms, in said supply (**2**_a_, **2**_b_, **2**_c_), is induced into an enclosure (**50**), having an inner and outer surface having walls (**50**_b_), having a second outlet opening (**51**_d_), and a first main inlet opening (**51**_a_), and a first secondary inlet opening (**51**_b_), and a third secondary inlet opening (**51**_b_), also having an upper wall (**50**_a_) with an inner and outer surface and independent side wall capable of sealing against side walls (**50**_b_), for seal and detachment to said housing (**50**), and a lower wall (**50**_c_), having an inner and outer surface with a first main inlet opening (**51***a*), and being resisted from the end of said housing (**50***b*), creating an inlet plenum with a plurality of supports. Mounted within the interior of said housing (**50**), resides a dividing wall (**50***d*), having an inner and outer surfaces and a plurality of openings (**51***c*, **51***d*), said wall (**50***d*) providing channeled air flow from and to the occupied confined space and mounting for a Boundary Layer Turbine apparatus contained within a first confined space (**10**), containing a boundary layer propulsion apparatus (**1**), providing inducing flow through inlet suction provide through the mechanical rotation of flow conduit (**6**), by mechanical means provide by prime mover (**8**), have a first opening (**7***d*), in communication with a first end of first flexible conduit (**4***a*), and a second end in communication with said outlet (**51***a*), and also having a second opening (**7***b*), in communication with a first end of second flexible conduit (**4***a*), and a second end in communication with said outlet (**51***b*), and a third outlet opening in the base of said prime mover housing (**8**), said prime mover also having upper a plurality of shock resistant attachments represented by (**9***a*, **9***b*) having a first end attached to the lower surface of said dividing wall (**50***d*), and a second end fixed to the upper end of prime mover housing (**8**). Prime mover (**8**), also having a first roller bearing (**8***a*) enclosing the circumference of primer mover armature (**9***b*) having a first end and a second end attached to a second roller bearing (**8***b*), containing the lateral movement of said primer mover armature (**9***b*) and also attached to flow conduit coupling (**3***b*), having a plurality of openings (**3***a*,**3***b*), and in communication with boundary layer turbine flow conduit (**6**) having a first end, and a second end in communication with a plurality of manifold ports embodied in this figure by (**3***c*), spaced between plurality of boundary layer disks (**5**), known to impart motion in a free flowing fluid, when placed into motion through the applied rotation from prime mover (**6**) fixed to the upper surface of the Turbine Rotor Enclosure wall (**4**), having a first and second surface, and a plurality of openings in the outer circumference between said enclosure wall (**4**) and housing wall (**51***b*), and a central opening set about the circumference of the lower end of prim mover (**8**) to communicate flow from the interior of prim mover (**8**) and the second end of turbine rotor flow conduit (**6**) provided for inlet air flow across prime mover for temperature reduction. As prime mover (**8**) applies rotation air flow is induced through said prim mover (**8**) and through main inlet (**51***a*) into the flow conduit (**6**), passing through said plurality of manifold openings (**3***c*), into spaces between boundary layer disks (**5**) at pressure and velocity, past prime mover (**8**), through said plurality of openings (**4***c*), in said turbine wall (**4**), into a plurality of openings (**51***c*, **51***d*), in into the plenum (**51***c*) in the lower section of Fluidized Bed Reactor (**20**), designed to distribute the said untreated stage one (**2***a*,**2***b*,**2***c*) contaminated inlet air supply obtained for and occupied confined space is evenly forced in a distributed manner throughout the plenum section (**21**), and distributed through a substrate (**23**), with an inner and outer surface, and retained by holder (**24**), affixed to the interior wall (**50***b*), through pressurized for of 4 inches of water column lifts a bed from a compacted state and expanded fluid state known in the art as fluidized bed, to a freeboard distance above the compacted state height illustrated by dashed line (**27**), that exposes the said stage one air contaminated air supply (**22**), to an alkaline sorbent bed mixture comprised of sodium bicarbonate (**25**), sodium carbonate (**26**), and activated carbon (**27**), as fluidized beds are known to provide a residents duration and a full contact surface as forced flow is diffused through the bed, so that the area reaction is maximized for chemical bonding to take place between chemical species, acidic, metal, and microorganism contaminated in said stage one air supply (**22**), and said sorbent bed (**20**), prior to entering a particle separator (**30**) section. Particle Separator having a sloping surface diverter plate (**32**), with a plurality of openings (**37**), at the outer edge for the gravity discharge of dislodged particles (**38**), and a central opening (**34**), and a plurality of openings (**33**), designed to channel air flow (**22**), against the center of the outer surface of confined space (**46**), separating entrained sorbent particles (**36**), through velocity reduction caused by impact on said surface (**46**), and plurality of 90 degree directional changes illustrated by (**35**),(**36**), and (**39**) or 180 degrees, as it is known in the art that flow directional changes and surface impacts reduced particle velocity of entrained particles and is an effective separation method, there by being allowing gravity to returning said particles (**37**), (**38**), illustrated by dashed path arrow (**31**), back to said fluidized bed (**20**), for reapplication in the fluidized bed reactor. As stage two air flow (**41**), enters the surface of packed bed filter (**42**), comprised of small diameter particles less than 80 micron of alkaline sorbent (sodium bicarbonate, sodium carbonate), (**42***a*), (**42***b*), and non alkaline activated carbon (**42***c*) known to assist in the removal of elemental mercury, in communication with and supported by porous substrate (**44**), having an inner and outer surface supported at the outer edge by retaining support (**43**), forming the upper permeable wall of confined space walls (**40**), in communication with outlet opening (**51***d*), through conduit (**46**), having a first end fixed to wall (**45**) and a second end fixed to said opening (**51***d*).

[0018] **FIG. 2** is a vertical cutaway cross sections of an preferred embodiment of this invention utilizing a first confined space cartridge (**63**), containing the sorbent treatment filtration system, held within a second confined enclosure (**69**), provide with a propulsion system (**61**), inducing said flow into a first open end cartridge (**63**), plenum of having lower compressible seal (**62***b*), compressed against a second enclosure seal (**62***a*), fixed to the inner wall of said enclosure (**69**), with said cartridge system (**63**), containing a fluidized bed (**63***a*), a diverter plate (**68***a*), having a fist plurality of openings (**68***b*), for the flow of air, and second plurality of openings for the flow of disengaged particles (**64**), and a third confined space (**65**), supporting a packed bed filter (**67**) by way of a porous substrate (**67***a*), affixed to said pack bed confined space (**65**), and in communication with the exterior of said enclosure (**69**), through a first and second flexible conduit connectors (**67***b*), accessible through a removable cover (**66**).

[0019] **FIG. 3 A** vertical cross section of two embodiments of cartridge filter systems showing a preferred design (**FIG. 3***a*), having a first confined space with vertical walls (**72***a*) with an inner and outer surface, a horizontal top (**72***b*), with an inner and outer surface, fixed to a first end of said walls (**72***a*), and a horizontal surface fixed to a first end of said walls (**72***a*), and having a second end fixed with compressible seals (**70***a*), fixed to a flared end (**70***b*), of extended walls (**72***a*), said first confined space having a first porous substrate (**71***a*), having a inner and outer surface, affixed to said walls (**72***a*), in communication with the second open end of said cartridge, supporting fluidized bed (**71***b*), comprised of said sorbents described in figure one, and having an expandable freeboard space limited by dotted line (**73**), and having a diverter plate (**74***a*), with a first plurality of openings (**74***b*), for the passage of air, and also having a second plurality of openings (**74***c*), for the passage disengaged particles, set below a second confined space having walls (**75***a*), to support a second porous substrate support (**76***b*), having an inner and outer surface, affixed to said walls (**75***a*), and supporting and packed bed filter (**76***a*) as described in figure one, in communication with first confined space and the interior of said second confined space, having a horizontal surface arranged in the lower segment of said confined space, with a first and second outlet (**77***a*, **77***b*) for the passage of air as previously described in figure one. Figure (**3***b*), is a simplified embodiment of figure (**3***a*), having identical said walls, seals, porous substrate supports, and provide the elimination of diverter plate, (**74***a*) and confined said second packed bed filter space chamber, and said plurality of outlets, replaced by a compressed packed bed held between a first porous substrate support (**82**), and a second substrate support (**83**), with a packed bed region containing identical sorbent material as previously described in figure one, and held between a said first substrate support (**82**), and said second substrate support (**83**), each affixed to chamber side walls allowing air to flow our an open end of said first confined space allowing greater cross sectional are for flow.

[0020] **FIG. 4**. is a vertical cross section of boundary layer turbine as described in figure one, having of a said confined space air flow (**90**), into said opening (**92**), protected by a screen (**117**), removable by slide attachment (**115**), set in said outer enclosure vertical walls (**91**), to capture large dust particles, fixed into a horizontal lower housing wall (**93**), having a first and second surface, with a central opening (**92**), for air inlet to flow conduit (**113**), in support of turbine housing (**114**), having slanted vertical walls, and an first upper horizontal wall (**96***a*), with central opening (**109**), and a plurality of openings (**110**), arranged about the outer circumference of said wall (**96***a*) with a second lower horizontal wall (**96***b*) having and inner and outer surface with a central opening (**96***c*), as the main inlet port, with a plurality of flexible supports (**94**), vertically supporting said turbine, and having flexible seals (**112**), affixed to said sloping vertical walls (**114**), and in compression with said outer vertical walls of enclosure (**91**), and also supported by a central flexible support (**106**), said internal horizontal wall (**104**), and prime the upper section (**103**). Prime mover (**99**), in communication with the exterior of said confined space (**91**) through a first flexible conduit (**100**), and a second flexible conduit **108**), having a first screen (**97**), and a second screen (**107**) to capture large dust particles, of prime mover (**99**). This embodiment include a central channel (**98**), having vertical walls with a first end attached to horizontal wall (**110**), and a second end attached to horizontal wall (**104** by way of flexible connector seal, (**98***a*).

[0021] **FIG. 6** Boundary layer disk details, **FIG. 5***a* is a transverse section of disk (**120**) having an outer circumference and a inner opening for attachment, with **FIG. 5***b*. showing a horizontal cross section A-A through said disk (**120**), showing a knife edge (**121**) to the edge of the outer perimeter of the disk to promote stabilization during disk rotation.

[0022] **FIG. 6**. a first embodiment of the flow conduit coupling attachment; whereas; **FIG. 6***a*. is transverse vertical view of said coupling of having plurality of holes (**124**), arranged about the surface, and an outer retainer support for attachment of the flow conduit (**125**), supporting said disks (**122**). FIG. (**6***b*) a cross section B-B, of FIG. (**6***a*), indicating a extend profile of the coupling prime mover armature attachment (**126**). FIG. (**6***c*) is another embodiment section B-B flow coupling showing a resist profile, of the flow said flow coupling attachment.

[0023] **FIG. 7**. Another simplified embodiment of the flow conduit; FIG. (**7***a*) a transverse cross section of said flow coupling having a outer cylindrical for attachment (**130**), having a central hub (**132**), for attachment of coupling to prime mover armature shaft;

[0024] **FIG. 7**. the preferred embodiment of the flow conduit coupling, simplified to allow the greatest air flow with the low turbulence comprised of; FIG. (**7***a*) having an outer cylindrical attachment (**130**) with a first open end attached to a circular plate having a wider outer diameter than the said cylindrical attachment (**130**), with a central opening attached to cylindrical attachment (**130**), and fixed to a central hub (**132**), by a plurality of spokes (**131**), FIG. (**7***b*) cross section (C-C), having an air foil shape known to improve air flow and reduce resistance from air impact when moving through a fluid. FIG. (**7***c*) arranged in the interior of the said cylinder (**130**).

What is claimed is:

1. A method of self propelled pollutant elimination using an apparatus to sequester a fluid stream from a occupied confined space, comprised of an enclosure with at least one fluid propulsion turbine generating high fluid flow at pressures and low noise in communication with at least one fluidized bed reactor, using an alkaline and non alkaline sorbent materials, receiving said flow through a diffused inlet substrate, under pressure expanding said sorbent bed and dispersing fluid flow through a full cross section out under low resistance pressure entraining a small portion of particles in the fluid stream, and being removed through a particle separator using flow diversion and impact of entrained fluid flow against a parallel wall to dislodged entrained particles and returning said particles back to the said fluidized bed, in a low counter current flow region of the fluidized bed flow chamber, preventing re-entrainment, as fluid flow path provides a 360 degree directional change prior to entering at least one packed bed filter removing of small entrained particles and any remaining pollutants prior to release to at least one outlet opening.

Providing, an outer housing comprised of a least one vertical wall with an inner and outer surface, circumventing the enclosure perimeter, with a first end and a second end having horizontal surfaces, providing a operating envelope, containing a plurality of unitary serially commutating compartments having at least two inlets and at least one outlet, situated on either side of a dividing horizontal wall centrally located having an surfaces, with a plurality of openings about the circumference, said dividing wall.

Providing a first compartment with a prime mover having walls with a first end and a second end supporting a rotating axial with a first end and a second end supported by said first end and the said lower surface of said dividing wall by at least one flexible attachment, and said second end mounted to a horizontal wall having a upper and lower surface providing first a centrally located opening for said axial penetration and fluid flow, and a second plurality of openings situated about the outer parameter of said surface for fluid flow,

Providing a second compartment with a boundary layer propulsion rotor comprising a flow conduit, with a singular circumferential wall with an interior and an exterior surface circumventing a radius, a first end fixed to said rotating prime mover axial through a flow coupling and a open second end, in communication with at least one inlet, with a plurality of manifold openings, located circumferentially about said wall and between an outer plurality of disks attached about the circumference of said flow conduit communicating fluid flow induced by boundary layer effect from rotating said plurality of disks fixed to said wall by a centrally located aperture opening propelling fluid flow from at least one inlet into said first compartment through said vertical enclosure wall for fluid flow from said rotor compartment into said prime mover compartment;

Providing fluidized bed reactor comprising of a porous substrate affixed horizontally above said interior horizontal wall with an upper and lower surface, and fixed about the perimeter of said substrate to inside surface of said vertical enclosure wall, forming a plenum confined space compartment in communication with fluid flow and;

Provided a fluidized bed reactor comprising of a alkaline and non alkaline reactive sorbent bed layer, supported by said substrate, with a thickness comprised of sodium bicarbonate, in its decomposed compound sodium carbonate, and activated carbon with particle diameter greater than 150 microns, with a volume of freeboard space required for bed expansion through fluid flow under pressure and velocity set below a;

Provided particle separator comprised of a circumferential wall with a surface sloping from the center of said separator toward said greater than 30 degrees with a centrally located main opening, and a plurality of radial openings, having a outer diameter smaller in the inside diameter of said vertical enclosure wall with a fluid flow between said particle separator outer diameter and the inner surface said vertical enclosure wall, and also set arranged below a lower wall of said pack bed confined space, provided for fluid flow diversion and as a particle impact surface,

Provide a said pack bed filter having a alkaline sodium bicarbonate, and it's decomposed compound sodium carbonate with a particle diameter greater than 65 microns with a thickness set with the first inner surface of a circumferential wall with an inner and outer surface and with a diameter less than the inside surface diameter of said vertical enclosure wall, and a lower horizontal wall forming a confined space, with no less then one outlet port, in communication with said enclosure outlet opening.

2. A Method of claim 1 of the use of pre-decomposed alkaline sorbent sodium carbonate applied to fluidized bed reaction and packed bed filtration of a confined space pollution control.

3. A Method of claim 1 of the use fluidized bed reaction, and packed bed filtration using sodium bicarbonate, and sodium carbonate for the destruction and removal of microorganisms, i.e. virus, bacteria, fungi, from a flowing fluid stream.

4. A Method of claim 1 for the use of a boundary layer propulsion to propel a fluid velocity and pressure sufficient to operate a fluidized bed reactor, particulate separator and packed bed filter with low noise generation for application within an occupied confined space environment.

5. An Method of claim 1 of a combined boundary layer propulsion, fluidized bed reactor, particle separation, and fluidized within one unitary apparatus for the sequestration of particulate matter, heavy metals, volatile organic compounds, and the neutralization of acids, and destruction of and microorganisms and their spores.

6. A Method of claim 1 for the introduction of decomposed sodium bicarbonate as sodium carbonate with an improved surface area obtained from the decomposition process and improved reactivity of exposed surface.

7. An method of claim 1 for alkaline and non alkaline fluidized bed reaction.

8. A Method is claimed of claim 1 for low pressure differential particulate separation from a flowing gas stream utilizing flow directional changes and surface impact to dislodge particulate from said flowing has stream.

9. A Method is claimed of claim 1 for a combined fluidized bed reactor, particulate separation, for particulate return to said fluidized bed for reaction.

10. A Apparatus for self propelled pollutant elimination using an apparatus to sequester a fluid stream from a occupied confined space, comprised of an enclosure with at least one fluid propulsion turbine generating high fluid flow at pressures in communication with the open sealed end adapted for use of a cartridge containing a fluidized bed reactor, a particle separator, packed bed filter apparatus with a removable upper section for the removal of said cartridge pollutions control within a confined space.

Providing, an outer housing comprised of a least one vertical wall with an inner and outer surface, circumventing the enclosure perimeter, with a first end and a second end having horizontal surfaces, providing a enclosure for cartridge application.

11. An Apparatus as claimed in claim 10. cartridge containing a fluidized bed reactor, particle separator, and pack bed filter as a removal and replaceable unit, with a enclosure with a walls with an inner and outer surface and with a first upper end fixed with outlet seals and a second end fixed with a inlet seals, separate from a main enclosure and fitting into said main housing, in communication said main housing propulsion system, with one inlet fixed with seals, main housing with matching seals preventing the passage of fluid flow around said cartridge channeling fluid flow through an apparatus comprised of;

Providing fluidized bed reactor comprising of a porous substrate affixed horizontally above said interior horizontal wall with an upper and lower surface, and fixed about the perimeter of said substrate to inside surface of said cartridge vertical enclosure wall, forming a plenum confined space compartment with seals to prevent fugitive fluid flow around said cartridge provided sealed communication with fluid flow under pressure and;

Provided a fluidized bed reactor comprising of a alkaline and non alkaline reactive sorbent bed layer, supported by said substrate, with a thickness comprised of sodium bicarbonate in its decomposed compound sodium carbonate, and activated carbon with particle diameter greater than 150 microns, with a volume of freeboard space required for bed expansion through fluid flow under pressure and velocity set below a;

Provided particle separator comprised of a circumferential wall with a surface sloping from the center of said separator toward said greater than 30 degrees with a centrally located main opening, and a plurality of radial openings, having a outer diameter smaller in the inside diameter of said vertical enclosure wall with a fluid flow between said particle separator outer diameter and the inner surface said vertical cartridge enclosure wall, and also set arranged below a lower wall of said pack bed confined space, provided for fluid flow diversion and as a particle impact surface,

Provide a said packed bed filter having a small particle alkaline sodium bicarbonate, and it's decomposed compound sodium carbonate with a particle diameter greater than 65 microns with a thickness set with the first inner surface of a circumferential wall with an inner and outer surface and with a diameter less than the inside surface diameter of said vertical enclosure wall, and a lower horizontal wall forming a confined space, with one outlet port, in communication with said cartridge enclosure outlet opening.

12. A Method of claim 11. for the introduction of decomposed sodium bicarbonate as sodium carbonate with an improved surface are obtained from the decomposition process and improved reactivity of exposed surface in a cartridge.

13. An method is claimed of claim 12 for alkaline and non alkaline fluidized bed reaction in a cartridge.

14. A Method is claimed of claim 11. for low pressure differential particulate separation from a flowing gas stream utilizing flow directional changes and surface impact to dislodge particulate from said flowing has stream within a cartridge.

15. A Method is claimed of claim 11 for a combined fluidized bed reactor, particulate separation, and particulate return to said fluidized bed for reaction.

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